



PTO/SB/81 (04-05)

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INDICATION FORM**

Application Number	10/613,499
Filing Date	7/3/2003
First Named Inventor	Hugh Herr
Title	Variable Mechanical Impedance Artificial Legs
Art Unit	3738
Examiner Name	Javier G. Blanco
Attorney Docket Number	VblMechImp01

I hereby revoke all previous powers of attorney given in the above-identified application.

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☒ Applicant/Inventor.☐ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

**SIGNATURE of Applicant or Assignee of Record**

Signature

Date

10/24/05

Name

Hugh Herr

Telephone

617-407-1202

Title and Company

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐ \*Total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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November 1, 2006

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Re: Office action dated 1/9/06 regarding U.S. patent application number 10/613,499

Dear Sirs:

This letter is responsive to the office action dated 1/9/06 (copy attached) regarding U.S. patent application number 10/613,499.

Regarding the examiner's item 1, applicant reiterates his traversal of the examiner's restriction requirement, on the grounds that claims 1 and 9 are generic.

Regarding the examiner's item 2, we acknowledge that claims 2, 4-8, 10, and 11 are withdrawn from consideration at this time.

Regarding the examiner's item 4, CFR § 1.68 **Declaration in lieu of oath** states:

Any document to be filed in the Patent and Trademark Office and which is required by any law, rule, or other regulation to be under oath may be subscribed to by a written declaration. Such declaration may be used in lieu of the oath otherwise required, if, and only if, the declarant is on the same document, warned that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon. The declarant must set forth in the body of the declaration that all statements made of the declarant's own knowledge are true and that all statements made on information and belief are believed to be true.

In a phone conversation with the examiner on 10/10/2006, it was agreed that no notary signature is required on the declaration submitted.

Regarding the examiner's item 5 and 6, the "control electronics" referred to at line 26 of page 16 of the specification (and shown in the drawings) are what is referred to elsewhere in the application as "spring rate controller" and "stiffness controller". This equivalence would be assumed by one of ordinary skill in the art by the way the terms are used in the specification and claims. At the request of the examiner, the attached page 16 of the specification has been amended to specifically call out this equivalence, and thus no change to the drawings is needed, since the control electronics is already called out in figure 7 by reference designator 710.

Regarding the examiner's item 7, the attached amendment to claim 9 corrects the informality pointed out by the examiner.

Regarding the examiner's item 8, all embodiments of the present invention provide controllable-spring-rate springs. The terms "controllable-stiffness spring element" and "controllable spring-rate spring", are used interchangeably. Claims 1 and 9 may be read as means plus function claims, where the means for implementing the "controllable spring rate" function (or, equivalently, the "controllable stiffness" function) is assumed to be definite in scope in that it is limited to the kinds of implementations disclosed in this patent application. In addition to providing controllable spring rate, catapult embodiments, bi-articular embodiments, and multiply-interlockable-spring-element embodiments store energy in such a way that some of the stored energy is released only under electronic control. Variable-mechanical-advantage embodiments of the present invention implement controllable spring rates without discontinuities in spring rate, and in these embodiments, all energy stored in the spring element is always available for complete release in response to external conditions without the intervention of the controller.

Regarding the examiner's item 11, the Petrofsky reference uses the term "stiffness" to refer to something totally different than spring rate, so it does not anticipate the present invention. In the mechanical arts, the term "stiffness" is sometimes used to refer to a parameter of a dissipative element (such as a shock absorber), and sometimes used to refer to a parameter of a non-dissipative element (such as a spring, or a weight raised against gravity). In the electrical arts, resistive elements include resistors, and non-dissipative elements include inductors, and capacitors. In the Petrofsky patent, the type of mechanical parameter which is being controlled is a dissipative parameter (such as a viscosity-based shock absorber). In the present invention, the type of parameter being controlled is a parameter of a non-dissipative element (a spring). Although it is common parlance to refer to a parameter of a shock absorber as its "stiffness", and to use that same word to refer to a parameter of a spring. A shock absorber is totally different from and in no way analogous to a spring. Thus, the present invention is totally different from and in no way analogous to the present invention.

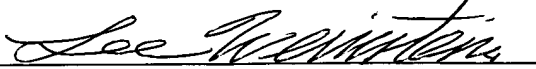
It is thus believed that all claims in the patent application should be allowable.

Included herewith, please find a power of attorney and change of correspondence address form, a petition to revive this unintentionally abandoned patent application, and a check in the amount of \$750.00.

Sincerely

  
Lee Weinstein, Registration #56,261

Certificate of express mailing: I certify that this document including the attached page of amended specification, check for \$225, and copy of the related office action were deposited with the US Postal Service as Express Mail, post office to addressee, November 6, 2006, express mail label number ED972798536US.

A handwritten signature in cursive script, reading "Lee Weinstein", written over a horizontal line.

Lee Weinstein

figure 13, energy may be transferred from chamber 905 to chambers 900 or vice versa in a delayed manner, by chambers 900 or chamber 905 first pressurizing chamber 901, then isolating chamber 901 by closing valves 903 and 904 for some period of time, then transferring the energy stored in chamber 901 to  
5 chambers 900 or 905 by opening the appropriate valves.

Figure 15a depicts a prosthetic ankle-foot system known in the art. Ankle spring 1500 is affixed to foot-plate 1501. One variable-stiffness embodiment of the present invention shown in Figure 15 uses a multiple-parallelly-interlockable-leaf-spring structure such as that shown in figure 12 in place of ankle spring  
10 1500. Multiple-parallelly-interlockable-leaf-spring 1600 allows for different spring rates in forward and backward bending, allowing separately controllable rates of controlled plantar-flexion and controlled dorsi-flexion.

In one embodiment of the present invention (shown in figure 15b), ankle spring 1500 is split into inner ankle spring 1500a, and outer ankle spring 1500b,  
15 and heel spring 1501 is split rearward of attachment point AP into inner heel spring 1501a and outer heel spring 1501b. In a preferred embodiment, ankle springs 1500a and 1500b and heel springs 1501a and 1501b each comprise actively-variable multi-leaf springs such as ankle spring 1600 in figure 14. Having separate inner and outer variable-stiffness ankle springs allows for active  
20 control of side-to-side stiffness of the prosthetic ankle joint. Having separate inner and outer variable-stiffness heel springs allows for active control medio-lateral ankle stiffness.

A pneumatic embodiment of a variable-stiffness spring for a prosthesis is shown in figure 16. Male segment 702 comprises one end of the overall  
25 variable-stiffness spring, and female segment 701 comprises the other end. Control electronics (also referred to herein as "stiffness controller", and "spring rate controller") 710 are contained in the upper end of male segment 710. Intake valve 715 is actuatable to allow air to enter pressure chamber 708 through air intake channel 716 when pressure chamber 708 is below atmospheric pressure  
30 (or an external pump may be used to allow air to enter even when chamber 708 is above atmospheric pressure). Air pressure sensor 709 senses the pressure in pressure chamber 708. Pressure chamber 708 is coupled to second pressure chamber 703 through valve 711. The air in pressure chamber 703 acts as a pneumatic spring in parallel with spring 704. Motor 705 turns ball screw 707 to